

CLAIMS

1. A method for producing a substantially isolated neural cell, characterized in that the method comprises carrying out the suspension culture of embryonic stem cells in the presence of an astrocyte conditioned medium or ingredients substantially equivalent to the conditioned medium.
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2. The method for producing a neural cell according to claim 1, wherein the embryonic stem cells are embryonic stem cells of a mammal.
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3. The method for producing a neural cell according to claim 2, wherein the mammal is selected from the group consisting of a mouse, a cynomolgus monkey, a human and a rat.
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4. The method for producing a neural cell according to any one of claims 1 to 3, wherein the method comprises the step (A) carrying out the suspension culture of embryonic stem cells in the presence of the astrocyte conditioned medium or ingredients substantially equivalent to the conditioned medium, thereby forming a stem cell sphere (SCS).
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5. The method for producing a neural cell according to claim 4, comprising carrying out after the step (A), the step of:
 (B) culturing the stem cell sphere (SCS) obtained in the step (A) in the presence of basic fibroblast growth factor (bFGF) and/or epidermal growth factor
25 (EGF) and in the presence of a cell adhesion molecule,

thereby obtaining a neural stem cell as a cell migrated from SCS.

6. The method for producing a neural cell according to claim 5, wherein the culture in the step (B) is carried out in the state of adhesion of the stem cell sphere (SCS) obtained in the step (A) to an adhesive culture substratum carrying a cell adhesion molecule.

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7. The method for producing a neural cell according to any one of claims 1 to 3, comprising carrying out the step of:

10 (A') carrying out the suspension culture of embryonic stem cells in the presence of the astrocyte conditioned medium or ingredients substantially equivalent to the conditioned medium, and in the presence of basic fibroblast growth factor (bFGF) and/or epidermal growth factor (EGF), thereby obtaining a neural stem cell in a stem cell sphere (SCS).

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8. The method for producing a neural cell according to claim 4, comprising carrying out after the step (A), the step of:

(B') culturing the stem cell sphere (SCS) obtained in the step (A) in the state of adhesion of SCS to an adhesive culture substratum carrying a cell adhesion molecule in the absence of basic fibroblast growth factor (bFGF) and/or epidermal growth factor (EGF) and in the presence of an astrocyte conditioned medium or ingredients substantially equivalent to the conditioned medium thereby obtaining a neuron.

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9. The method for producing a neural cell according to claim 4, comprising

carrying out after the step (A), the steps of:

(B) culturing the stem cell sphere (SCS) obtained in the step (A) in the presence of basic fibroblast growth factor (bFGF) and/or epidermal growth factor (EGF) and in the presence of a cell adhesion molecule; and

5 (C) culturing the SCS obtained in the step (B) in the state of adhesion of SCS to an adhesive culture substratum carrying a cell adhesion molecule in the absence of bFGF and/or EGF,

thereby obtaining a glial cell as a cell migrated from SCS.

10 10. A method for producing a neuron, comprising the step of culturing the neural stem cell obtained by the method according to any one of claims 1 to 7 in the state of adhesion of the neural stem cell to an adhesive culture substratum carrying a cell adhesion molecule in the absence of basic fibroblast growth factor (bFGF) and/or epidermal growth factor (EGF), and in the presence of the 15 astrocyte conditioned medium or ingredients substantially equivalent to the conditioned medium.

11. A substantially isolated neural stem cell, which is differentiated from an embryonic stem cell by the method according to any one of claims 1 to 7.

20 12. The neural stem cell according to claim 10, wherein the neural stem cell is cryopreserved.

25 13. A substantially isolated neuron, which is obtainable by the method of claim 8 or 10.

14. The substantially isolated neuron according to claim 13, wherein the cell
expresses at least one kind selected from the group consisting of class III β
tubulin, neurofilament, tyrosine hydroxylase, glutamate decarboxylase and
choline acetyltransferase.

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15. A substantially isolated glial cell, which is obtainable by the method
according to claim 9.

10 16. A cell pharmaceutical composition comprising, as an active ingredient, a
substantially isolated neural stem cell which is differentiated from an embryonic
stem cell by the method according to any one of claims 1 to 7.

15 17. A cell pharmaceutical composition comprising, as an active ingredient, a
substantially isolated neuron obtainable by the method according to claim 8 or 10.

18. A cell pharmaceutical composition comprising, as an active ingredient, a
substantially isolated glial cell obtainable by the method according to claim 9.

20 19. A method for treating a neurodegenerative disease or nervous damage,
characterized in that the method comprises introducing into a neurodegenerative
site or a nervous damage site at least one cell selected from the group consisting
of:

25 (1) a substantially isolated neural stem cell which is differentiated from an
embryonic stem cell by the method according to any one of claims 1 to 7;

- (2) a substantially isolated neuron obtainable by the method according to claim 8 or 10; and
- (3) a substantially isolated glial cell obtainable by the method according to claim 9.